

WARNING

Installing, commissioning and operating of this product may be performed by thorough trained and specialised personnel *

only. We explicitly will not take any responsibility for any damage on our products caused by improper installation, configuration and handling. Internal modifications must solely be carried out by specialised personnel authorised by

VA TECH SAT GmbH & Co / Division PE.

- * **Definition:** Specialised personnel, when authorised and properly instructed, may perform following tasks:
- Installing, mounting, commissioning and operating of the apparatus and the system when familiar with.
 - Maintenance and use of safety equipment according to standard rules and regulations.
 - First Aid after extensive training.

Field of application

The DRS-LIGHT - a member of the protective relay family DRS - is a multifunctional, digital relay. As a single unit the field of application consists of protection for small generators, transformers, motors, feeders and back-up protection. In combination with other devices of the DRS-Family the DRS-LIGHT can be used for an economic complementation of one or the other necessary protective function - independently of the size of the protected plant.

Our know-how and competence for more than 40 years in power station technology and in development and application of protective systems guarantees high performances and qualified solutions.

Concerning the multi-functionality we cover a large range of applications with just a few different types.

Highlights

- Extreme reduced costs for spare part storage by only a few different types of hardware
- 4 standard configurations for 50 or 60Hz - applications
- Special configurations for 16,7Hz traction applications
- Customer specific configuration on request
- High integrated and reliable digital technology
- Plant tested protective functions from the "DRS-Protective Library"
- Self monitoring of hard- and software
- 10 LEDs, 8 of them free programmable
- 2-line, 16-digit LCD for local visualisation
- Keypad for local access via menu
- RS485 communication interface with PC
- Optional communication: IEC60870-5-103
- Comprehensive, intuitively learnable, graphic operation software DRS-WIN under MS Windows® on the PC enables easy setting of parameters of the device (optional)
- DRS-WIN also contains fault analysis FFT and remotal diagnosis.
- Cases for panel flush/projection mounting and for 19" racks

Technical Data

Analogue Inputs (type specific)	4/6 CTs; 1A or 5A depending on connections
Nominal frequencies	4 VTs; 100/110/120V
Binary inputs	50; 60; 16.7Hz
Binary outputs	4 free programmable
Contacts	3 trip-/alarm relays free prog.able
Interfaces	1 internal fault
Trip/LED-matrix	8 LEDs, 2 for internal status
Auxiliary Supply	acc. VDEW - recommendation
Local operation	RS485, optional IEC 60870-5-103 integrated software matrix
	240/220/110/60/24/VDC,(VAC), approx. 10W
	6 keys, 2 x 16 digit LCD

Binary Inputs

Input voltages V_H	240, 220, 110, 60, 24VDC
current consumption	2.5 – 3 mA
operation value	approx. $0.7 \times V_H$

Binary Outputs

Contact data	Contact voltage: max. 250VDC
Trip contact	continuous current 8A
OUT1, OUT2	
OUT3.1, OUT3.2	
(OUT4, OUT5, OUT6)	continuous current 16A
Further data	Contact material: $AgSnO_2$
Mechanical live duration	5×10^7 switching cycles
Insulation	Open contact: $1000 V_{RMS}$
	Contat-coil: $5000 V_{RMS}$

Current Inputs

Nominal current	1/5 A according to connections
Continuous current	$4 \times I_N$
Thermal withstand	$10 \times I_N$, 30s
	$100 \times I_N$, 1s
	$250 \times I_N$, 1 half cycle
Burden	$<0,1 VA$ at I_N

Voltage Inputs

Nominal Voltage V_N	100/110/120V
Maximum Voltage	220V continuous
Burden	$0,3VA$ at V_N

Screw type terminals

Current inputs	cross section 4 mm^2
Rest	cross section 2.5 mm^2

Technical data of optional components

Increase of binary IN/OUTputs (DRS-L-IOX)	2 IN with common potential, 3 OUT potential free, 4 OUT with common potential
NC function of contacts	OUT1, OUT2, OUT3.1 and OUT3.2
Accelerated output relay	OUT2
Sensitive current input I4	nom. current 20mA

Tests

Type tests	EN 50263	
Interference emission	IEC 60255 part 25;	
1MHz burst test,	IEC 60255 part 22-1,	Class 3
ESD test	IEC 60255 part 22-2,	Class 4
Radiated Electromagnetic Field	IEC 60255 part 22-3;	
El. Fast Transiente Burst	IEC 60255 part 22-4,	Class 4
Surge test	IEC 61000-4-5;	Class 3
Vibration test	IEC 60255 part 21-1,-2	
Conducted Interference	IEC 61000-4-6;	
Power frequency magnetic fields	IEC 61000-4-8;	Class 4
Insulation test	IEC 60255-5;	5kV
CE Plaque 2000		

Case data

Protection type	IP51
Mounting	Panel flush or projection mounting, 19", 6U height / 21U width
Dimensions in mm	H x W x D: 243 x 96 x 208 Please also refer to dimensional drawing of the various device types.
Weight	Approx. 3 – 4 kg depending on type

Technical Highlights

- Powerful processor
- Flash-PROM enables easy upgrade
- Long record time of fault records also by disconnected aux. supply
- Hall effect CTs
- Wide range for aux. supply voltage and for binary inputs
- High EMV by galvanized surface and EMV-construction
- Continuous hardware and software self monitoring

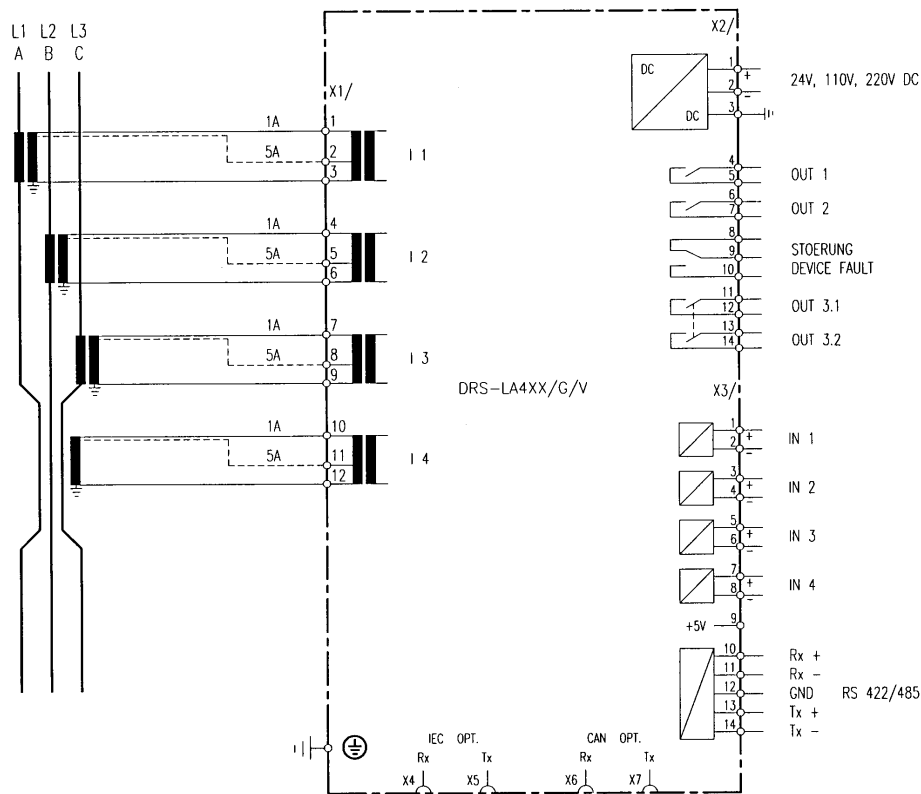
DRS-LA4

- Multi functional current relay
- Analogue Inputs: 4 CTs with 1A or 5A depending on connection
- Generator main or back-up protective relay for current, overload and negative phase sequence faults
- Line-, cable-, transformer- and motor feeder protective relay
- Configured for 50 or 60 Hz applications
- Not used functions can be blocked
- Available options please refer to table "Options" (Page 10)

Table of function configuration

ANSI/IEEE	Name of function	DRS-library
50/51	Overcurrent 3-ph., 2 st. IDMT	MI325
50/51	Overcurrent 1-ph., 2 st. IDMT	MI125
50/51/37	Over-/Undercurrent 3-ph., 2 st. DT	MI323
50/51/37	Over-/Undercurrent 1-ph., 2 st. DT	MI121
46	Negative phase sequence	MN211
49	Overload1-ph.	ML121
-	Signal function	MB111
-	Basic functions	

Application drawing / typical connections



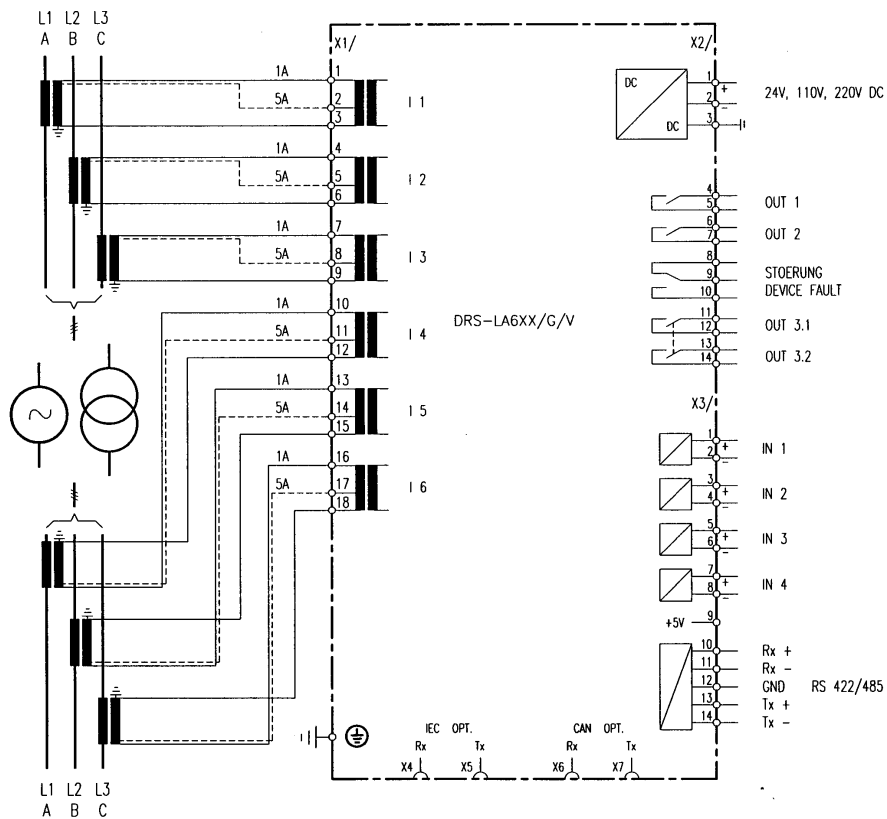
DRS-LA6

- Multi functional current relay
- Analogue Inputs: 6 CTs with 1A or 5A depending on connection
- Generator / Unit 2-winding transformer differential relay containing:
 - Blocking at 2nd and 5th harmonic
 - Transformer vector group and CT-ratio compensation by software
- Zero sequence filter ON/OFF optionally controlled via external signal
- Overcurrent and Overload protective function
- Configured for 50 or 60 Hz applications
- Not used functions can be blocked
- Available options please refer to table "Options" (Page 10)

Table of function configuration

ANSI/IEEE	Name of function	DRS-library
87T,U	Transformer/Unit Diff. 2-wdg., 3-ph.	MD321
51/37	Over-/Under current 3-ph., 1 st.	MI313
51/37	Over-/Under current 3-ph., 1 st.	MI313
49	Overload 1-ph.	ML121
-	Signal function	MB111
-	Basic functions	

Application drawing / typical connections



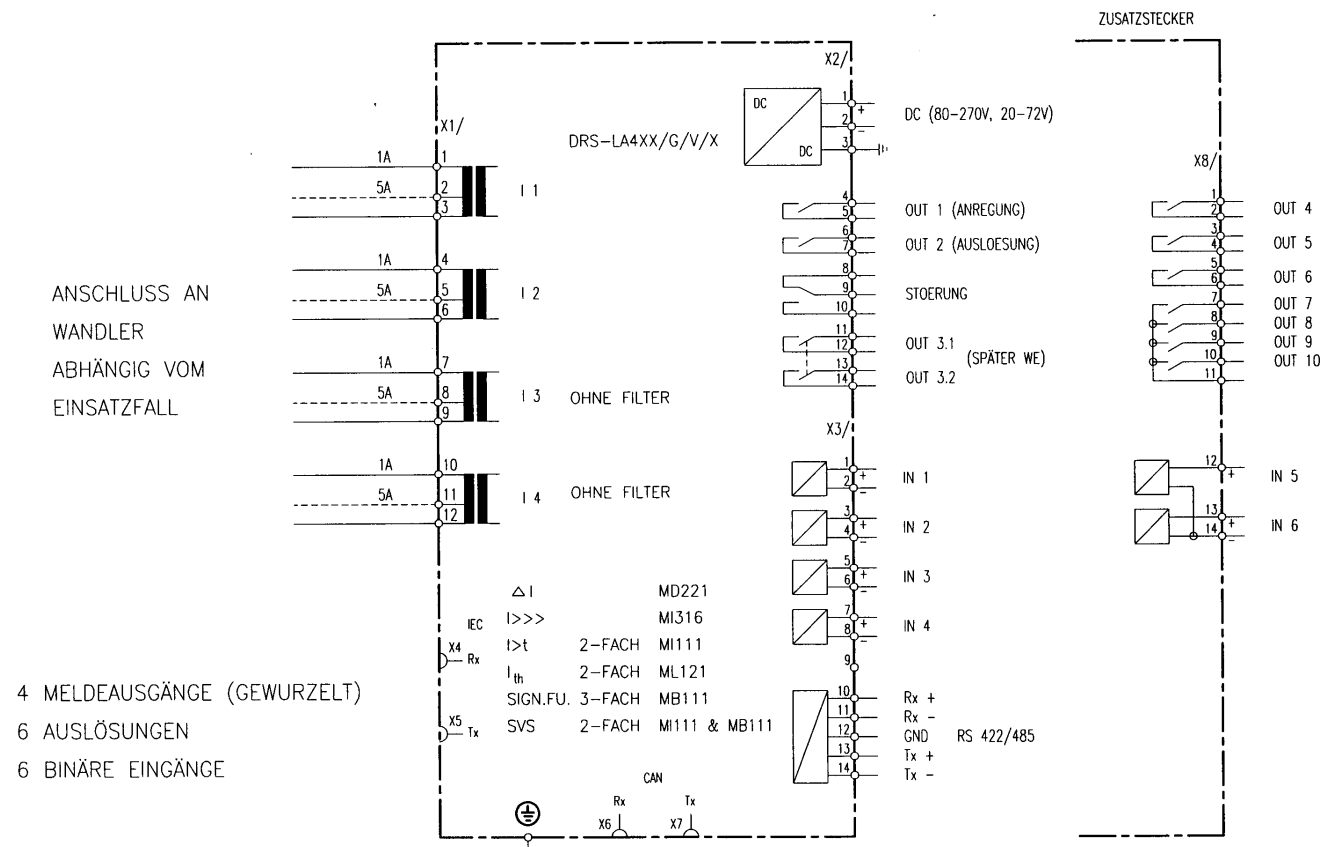
DRS-LA4 16.7Hz

- Multi functional current relay
- Analogue Inputs: 4 CTs with 1A or 5A depending on connection
- For specific 16.7Hz-traction applications
- Differential-, Current-, Overload-, CB-failure protection relay for 2-phase systems
- Not used functions can be blocked
- Available options please refer to table "Options" (Page 10)

Table of function configuration

ANSI/IEEE	Name of function	DRS-library
87T,U	Transformer/Unit diff. 2-wdg., 2-ph.	MD221
51/37	Over-/Under current 1-ph., 1 st.	MI111
51/37	Over-/Under current 1-ph., 1 st.	MI111
50	Over current 3-ph., 1 st.	MI317
49	Overload 1-ph.	ML121
49	Overload 1-ph.	ML121
-	CB-failure protection	1xMI111
-	Signal function	7xMB111
-	Basic functions	

Application drawing / typical connections



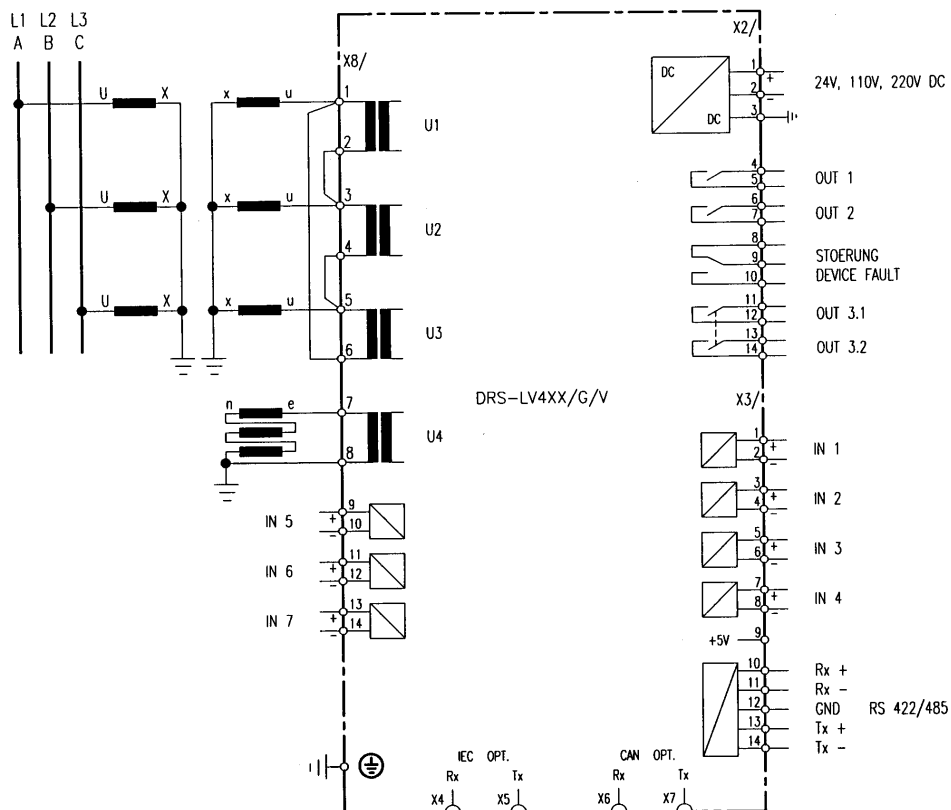
DRS-LV4

- Multi-functional voltage relay
- Analogue Inputs: 4 VTs with 100/110/120V
- Over-/Underfrequency and V/Hz-protection
- Configured for 50 and 60 Hz applications
- Not used functions can be blocked
- Available options please refer to table "Options" (Page 10)

Table of function configuration

ANSI/IEEE	Name of function	DRS-library
59/27	Over-/Under voltage 3-ph., 2 st.	MU323
59/27	Over-/Under voltage 3-ph., 1 st.	MU313
81	Frequency 4 st.	MF141
59/27	Over-/Under voltage 1-ph., 2 st.	MU121
51/37	Over-/Under voltage 1-ph., 1 st.	MU111
24	Overfluxing (V/Hz) 2 st.	MX121
-	Signal function	MB111
-	Signal function	MB111
	Basic functions	

Application drawing / typical connections



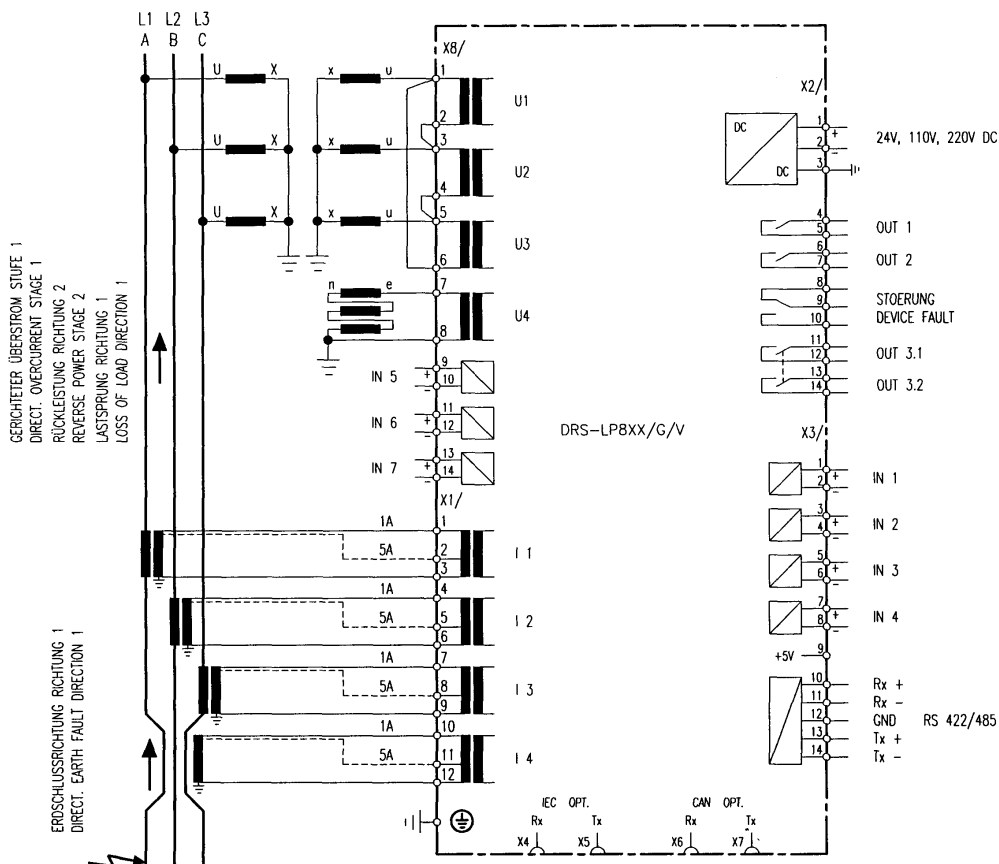
DRS-LP8

- Combined multi-functional protective relay
- Analogue Inputs: 4 CTs with 1A or 5A depending on connection,
4 VTs with 100/110/120V
- Minimum impedance, directional over-current , directional earth fault and reverse power
- Generator main- or back-up protective relay, line-, cable-, transformer-, motor feeder protection
- Configured for 50 and 60 Hz applications
- Not used functions can be blocked
- Available options please refer to table "Options" (Page 10)

Table of function configuration

ANSI/IEEE	Name of function	DRS-library
21	Minimum Impedance 3-ph., 2 st.	MZ322
67	Directional over-current 3-ph., 3 st.	MI332
67	Directional earth fault 1-ph., 1 st.	MS111
32	Reverse power 3-ph., 1 st.	MP312
-	Basic functions	

Application drawing / typical connections



Communication

The DRS-LIGHT has got two interfaces for communication.

One connection is provided for operation by the protection engineer and for maintenance and service (e.g. flash memory enables upgrading).

It is a local RS485-interface for a Windows PC with an operation cable or for remotal access via MODEM or multi-connector DRS-COM.

A second optional interface is provided for the station control system. This interface supports either the usual IEC 60870-5-103 protocol or the protocol IEC 60870-5-104 via ETHERNET. A third also optional connection is prepared for expansions of I/O-periphery via CAN-bus-devices.

Table "Options"

Possibility of application in the different model types

	DRS-LA4	DRS-LA6	DRS-LA4 16.7	DRS-LV4	DRS-LP8
Increase of numbers of Binary IN/OUTputs (DRS-L-IOX)			●	●	
Auto reclose function	●		●		
Contacts with NC function		●	●	●	●
Accelerated trip relay	●	●	●		
Sensitive current input 4	●	●	● ^{*)}	● ^{*)}	●

^{*)} on request

General type code

DRS-LXXXX/G/V/Hz/X//A/M/F/S

A		Type of relay (inputs)
V		Current relay
P		Voltage relay
		Current- / voltage relay
		Number of measuring inputs
4		4 currents
6		6 currents
8		4 currents, 4 voltages
		Protective functions
11		Standard configuration according to short technical description
XX		Special configuration (XX-allocation by VA TECH SAT)
		Mechanical design (case)
A		projection mounting
E		panel flush and 19"-rack mounting
		Auxilliary supply voltage and input voltage for binary inputs
1		240/220 VDC; threshold binary inputs: approx. 150 V
2		110 VDC; threshold binary inputs: approx. 73 V
3		24 VDC; threshold binary inputs: approx. 17 V
4		60 VDC; threshold binary inputs: approx. 41 V
5		Special voltage
		Nominal frequency f_N
16		16.7 Hz
50		50 Hz
60		60 Hz
		Additional Hardware (for traction applications)
-		Without extensions
X		Increase of numbers of binary IN/OUTputs (DRS-L-IOX)
		Communication to SCADA and CAN-Bus
0		Without interface extension
1		Interface for IEC 60870-5-103 (fibre optic)
2		Interface for IEC 60870-5-104
3		Interface for CAN-Bus
4		Interface for IEC 60870-5-103 (fibre optic)+CAN-Bus
5		Interface for IEC 60870-5-104 + CAN-Bus
		Auto reclose function
0		Without auto reclose function
1		With auto reclose function
		Type of contacts (Standard contacts / NC-function)
-		Contacts have standard functions
R		Contacts have normally close (NC) function (no auto reclose possible!)
		Output relays, operation times
-		Output relay standard
1		Output relay OUT2 accelerated
		Sensitivity of current inputs (measuring range)
-		Current input 4 (channel 4) in standard version
S		Current input 4 (channel 4) has sensitive range

List of installed protective functions with parameters and options
Over/Under current protection (51 / 37):

Type: MI323/MI121, 3-phase/1-phase, 2-stage
 Setting range: 0.1 - 5 x I_N in steps of 1 % +
 0.1 - 30 x I_N in steps of 5 %
 Time delay: 0 to 10 s in steps of 50 ms
 Measuring method: amplitude of 1st harmonic each phase

Over/Under current protection (51 / 37):

Type: MI313/MI111, 3-phase/1-phase, 1-stage
 Setting range: 0.1 - 5 x I_N in steps of 1 %
 Time delay: 0 to 10 s in steps of 50 ms
 Measuring method: amplitude of 1st harmonic each phase

Inverse time over current protection (51):

Type: MI325/MI125, 3-phase/1-phase, 2-stage
 Operation value stage 1: 0.05 - 2 x I_N in steps of 1 %
 Time multiplier stage 1: 0.05 - 1 in steps of 0.025
 Characteristic stage 1: extremely, very, normal, long inverse
 Operation value stage 2: 1 - 31 x setting value stage 1
 in steps of 1
 Time delay stage 2: 0 - 10 s in steps of 50 ms
 (definite time)
 Measuring method: amplitude of 1st harmonic each phase

Overload thermal (49):

Type: ML121, 1-phase
 Time constant: 2 - 100 min in steps of 1 min
 CT ratio compensation setting: 0.4 - 2 in steps of 1 %
 Temperature alarm: 25 - 150% in steps of 1%
 Temperature trip: 25 - 150% in steps of 1%
 Measuring method: Replica of heating curve
 (Temperature ~ I^2 with exponential relation:
 thermal time constant of winding)

Negative phase sequence (46):

Type: MN211, 1-stage
 Operating value: 5 - 50% in steps of 5 %
 Time delay: 0 - 10s in steps of 50 ms
 Measuring method: Calc. of neg. seq. component with I_{L1} and I_{L3}

Over/Under voltage protection (27 / 59):

Type: MU313/MU323, 3-phase, 1- /2-stage
 Setting range: 2-200 V in steps of 0,2 V
 Time delay: 0 to 10 s in steps of 50 ms
 Measuring method: amplitude of 1st harmonic each phase

Over/Under voltage protection (27 / 59):

Type: MU111, 1-phase, 1-stage
 Setting range: 2-200 V in steps of 0.2 V
 Time delay: 0 bis 10 s in steps of 50 ms
 Measuring method: amplitude of 1st harmonic each phase

Transformer differential protection (87T):

Type: MD321/MD221, Δ , 3-phase/2-phase, 2-winding
 Setting range: 0.2 - 0.6 x I_N in steps of 1 %
 Bias: 40 - 60% in steps of 5 %
 Rush stabilizing: 2. harm.: 20-50 % in steps of 1 %
 5. harm.: 10-20 % in steps of 1 %
 High set stage: 2-15 x I_N in steps of 1 x I_N
 Zero sequence filter: selectable OFF / ON / EXT
 Vector group: selectable: No, 1, 7, 5, 11, 0, 6
 Measuring method: 3 x current difference L1, L2, L3 for
 system 1-2; 2 x current difference L1, L3 for system 1-2

Minimum impedance protection (21):

Type: MZ322, 3-phase, 2-stage
 Current stage 1: 0.5 - 5 x I_N in steps of 1 %
 Impedance stage 2: 0.5 - 20 % in steps of 0.1%,
 circle characteristic
 Time delay: 0 - 10 s in steps of 50 ms
 Measuring method: Impedance of the 3 systems from
 phase currents and phase voltages
 (3 x current, 3 x voltage)

Overfluxing protection (24):

Type: MX121, 2-stage
 Operating values: both stages: 0.8 ... 1.5 p.U. in steps of 1%
 Time delay: both stages: 0 ... 10 s in steps of 50 ms
 Measuring method: Calculation of overfluxing by V/f

Reverse power protection (32 / 37):

Type: MP312, 3-phase, 1-stage
 Setting range: -5 to -0.2% P/ P_N in steps of 0.1%
 Time delay: 0 - 180 s in steps of 0.1 s
 Selection: phase sequence, current direction,
 Over / Under detection, CT error correction
 Measuring method: Calculation of power of the
 positive phase sequence system

Frequency protection (81):

Type: MF141, 4-stage
Operation values: 10 - 65 Hz in steps of 0.01 Hz
Time delay: 0 - 10 s in steps of 50 ms
Operation voltage: 60 – 100V / 100 – 140V
Selections: Under/Over detection
Measuring method: Measuring of phase angle
between measured voltage vector and synchronising frequency

Directional over current (67):

Type: MI332/MI132, 3-phase/1-phase, 3-stage
Operation values: $0.1 - 5 \times I_N$ in steps of 1 %
Time delay: 0 - 10 s in steps of 50 ms
Measuring method: Calculation of direction via phase currents and
phase to phase voltages.

Overcurrent high speed (50):

Type: MI317, 3-phase, 1-stage
Operation values: $0.5 - 5 \times I_N$ in steps of 10 %
Time delay: 100 to 500 ms in steps of 10 ms
Measuring method: fast current measuring

Automatic reclose function (79) (Option)

Type: MA311, 3-pol. multi-shot reclosing
Number of reclosing cycles each event: max. 10
Dead time 1: 0,2 - 2,0 s in steps of 0.1s
Dead time 2-4: 1 - 60 s in steps of 1s
Dead time 5+: 1 - 60 s in steps of 1s
Reclaim time: 2,0 - 180,0 s in steps of 0.5 s
Reclaim time manual-ON: 2-10 s in steps of 0.5 s
CB-ON command: 0.25 - 5 s in steps of 0.05s
CB-ON command double pole via OUT 3.1 and OUT 3.2

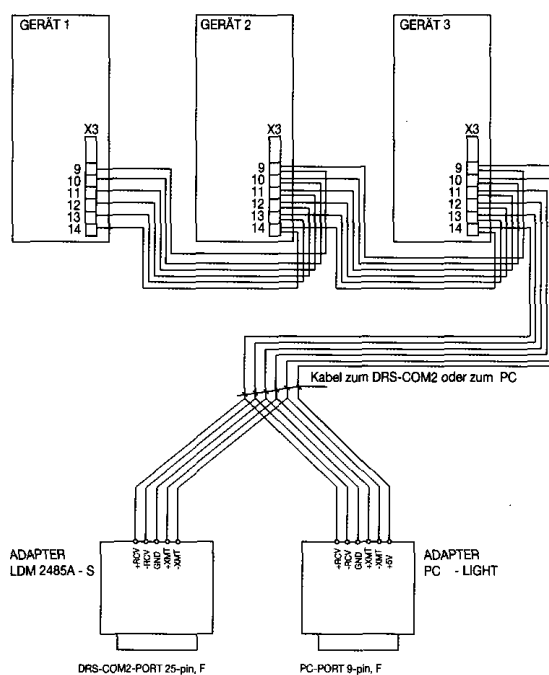
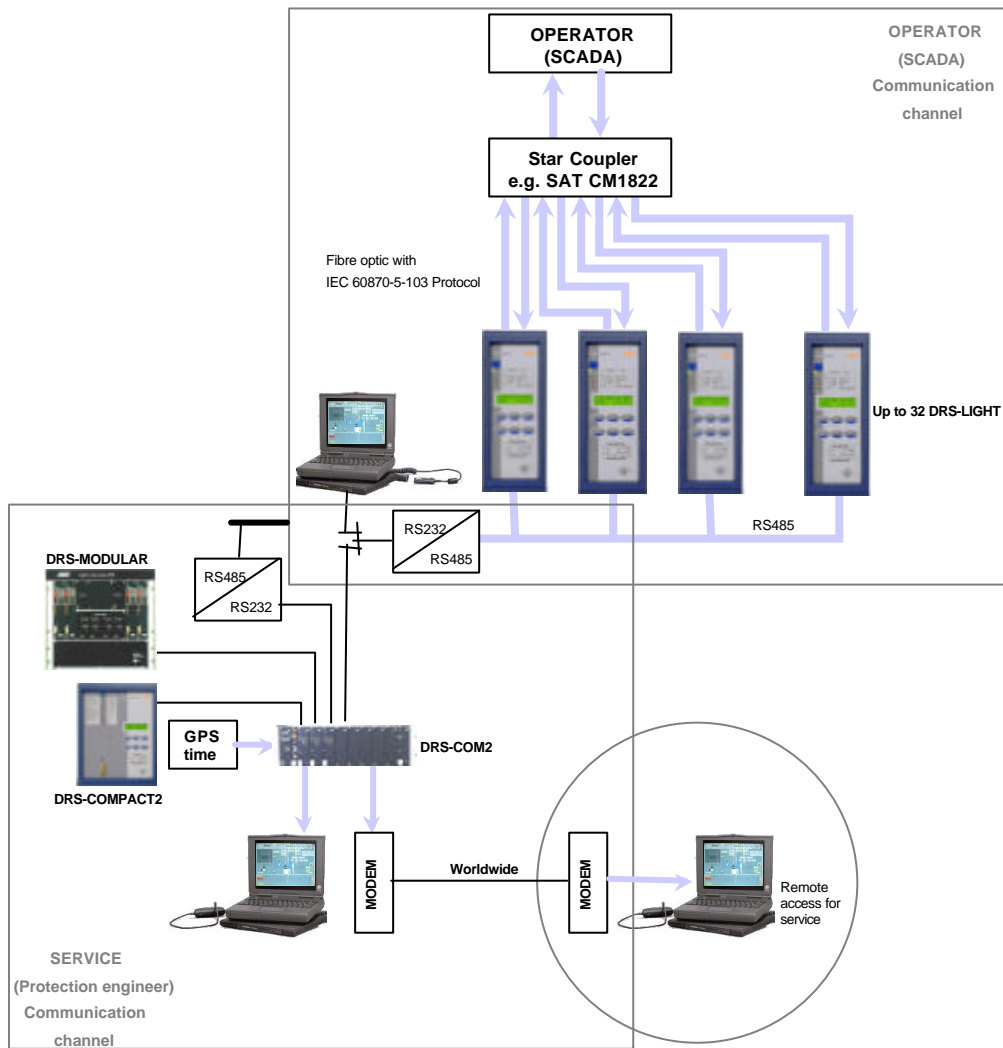
Signal function 1:

Type: MB111, 1-signal, 1-stage
Operation: raising, falling
Time delay: 0 – 10 s in steps of 50 ms

Base functions in every relay

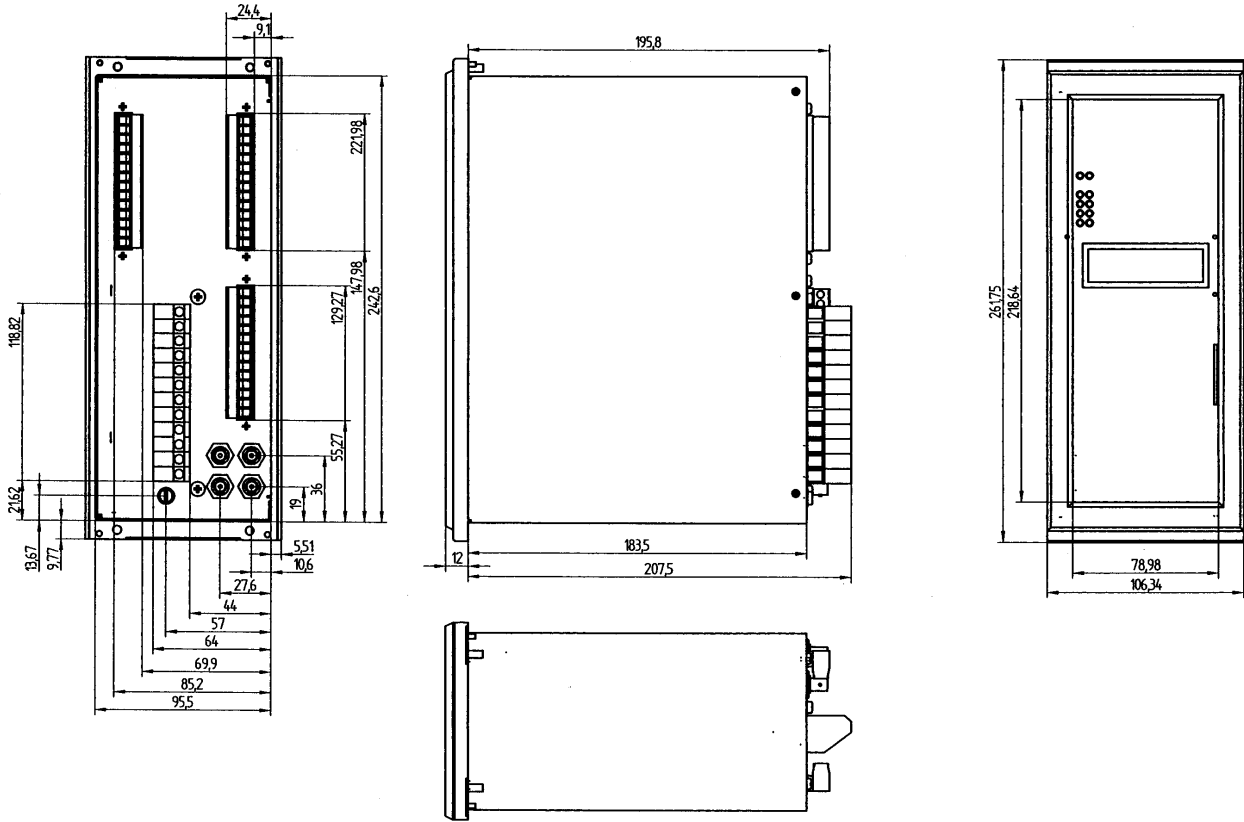
Fault recording
Alarm protocol
Self supervision
CT / VT supervision
Time synchronisation
Operation Software

Communication

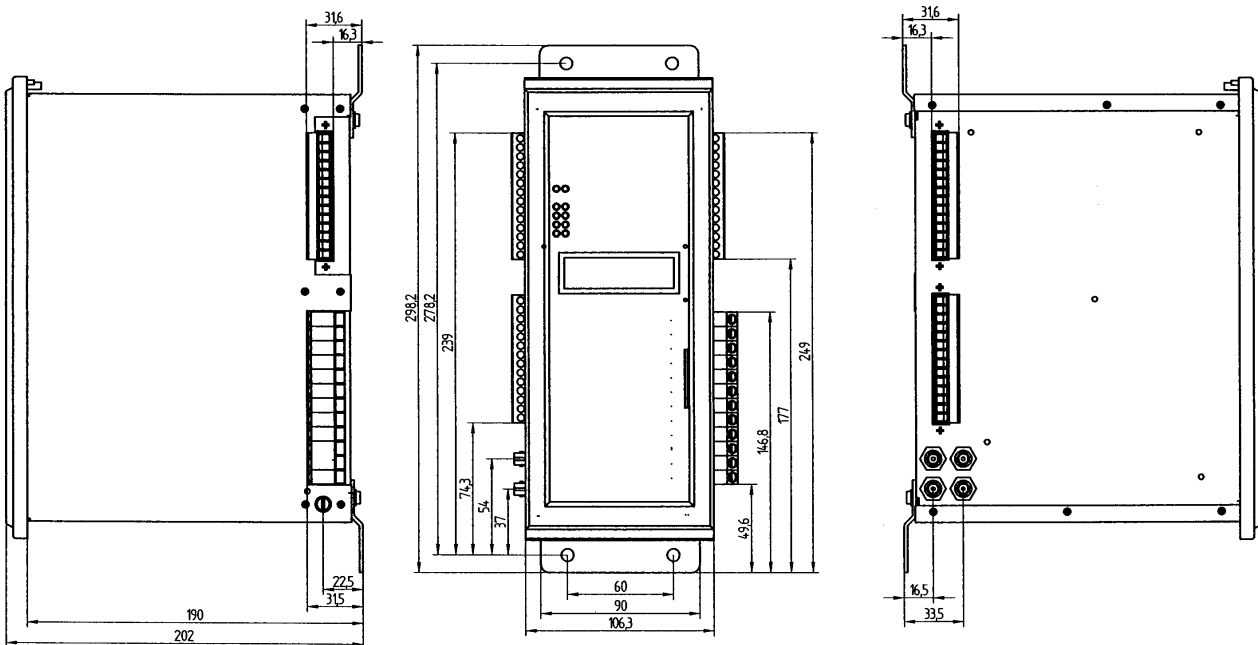


Dimensional Drawing

Case for flush panel mounting of DRS-LP8 (6 U height, 21 U width in 19"-rack) (Dwg.No.:3-534.523, 8/11)



Case for projection mounting of DRS-LP8 (Dwg.No.:3-534.523, 9/11)



Sales- and delivery conditions for domestic sales:

Please refer to General sales conditions and the general delivery conditions for products and fulfilments of the electric industry. The prices are in EURO ex works inclusive package. The turnover (value-added tax) is not included in the prices. It is calculated based on the actual legal rates.

For export sales:

Please refer to General Delivery Conditions for products and fulfilments of the electric industry. Also refer to further price guide conditions for our customers.

If not mentioned otherwise in this short description, changes are preserved, especially values, measurements and weight. The diagrams and drawings are without obligation. We preserve changes of the price and we will invoice the actual price with the delivery.

Regulations for export

The here mentioned products do not need an export permit referring to the actual regulations of the Austrian export list and the US–Commerce Control List. A duty for export permit can exist regional in case of a specific purpose of the products. The identification in the delivery form and in the invoice is decisive. Subject to alteration.

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You can find the protection division under:

http://www.sat-automation.com/neptun_schutz.htm

We preserve technical changes.

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According to our experience following the instructions outlined in this document will provide the most satisfactory service performance.

In case of unusual troubles, which cannot be resolved by referring to this literature, please contact our nearest agent or our Head Office.

When commissioning, the operating instructions and also the applicable Local Safety Standards have strictly to be observed.

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